Time: 3 hour **Max Marks: 80**

Note: 1. Q1 is compulsory
2. Solve any three from remaining

Q1 Solve any Four out of Six **20**

A. Classify Rolling processes. Write advantages and applications of rolling.
B. Classify metal spinning, write applications, and explain any one type of it.
C. Differentiate Direct and indirect extrusion.
D. Explain various defects in forging with their causes and remedies.
E. What is spring back in bending? Explain how it can be minimized.
F. Write advantages and limitations of hot and cold working

Q2 A. A block made of a perfectly plastic material with yield stress of 160 MPa in plain strain has dimensions 200 x 100 x 150 mm (b x hx w). Calculate the peak pressure P at the centre of the die. Also calculate minimum pressure at the edges. Assume sticking friction condition and Tresca's yield criterion. **20**
B. Explain the effect of temperature and strain rate on metal forming.

Q3 A. The thickness of plate is reduced from 30 mm to 10 mm by successive cold rolling passes using identical rolls of diameter 600 mm. Assume that there is no change in width and coefficient of friction between the rolls and the workpiece is 0.1. Calculate the minimum number of passes required. **20**
B. What is maximum draft in rolling? Derive equation for maximum draft.

Q4 A. In a wire drawing operation, the initial wire diameter is 7 mm and final wire diameter is 6.3 mm. the half die angle $\alpha=10^0$. Find the drawing stress considering $\mu=0.1$ and $k=20$ N/mm^2. Also calculate the maximum reduction possible. **20**
B. Explain tube drawing process.

Q5 A. Explain stretch forming with advantages, limitations, and applications. **20**
B. Write types, causes, and remedies for deep drawing defects.

Q6 A. Explain explosive forming process with advantages, limitations, and applications **20**
B. Explain various defects in extrusion with their causes and remedies.

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